

IN THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of claims:

Claims 1-9 (*Canceled*)

10. (*Withdrawn*) Apparatus for the combined drug/electric-stimulation treatment of a cardiac muscle, comprising:

means for creating an electric potential between at least two points located in the vicinity of the cardiac muscle;

means for causing a non-excitatory DC electric current signal to flow between said at least two points;

means for controlling the start time, duration and magnitude of the electric current signal flowing between said at least two points; and

means for superimposing on the electric current signal one or more waveforms of given frequency and amplitude, thereby to generate a complex signal.

11. (*Withdrawn*) Apparatus according to claim 10, comprising:

means for creating an electric potential between at least a pair of electrodes in the vicinity of the cardiac muscle at at least two root locations;

means for causing a non-excitatory electric current signal to flow between said at least two root locations;

means for controlling the start time, duration and magnitude of the electric current signal flowing between said at least two root locations; and

means for superimposing on the electric current signal one or more waveforms of given frequency and amplitude, thereby to generate a complex signal.

12. (*Currently Amended*) Apparatus comprising circuitry for creating a non-excitatory electric potential between at least two points located in the vicinity of a muscle, comprising circuitry for controlling the start time and/or the duration of the electric potential generated between said at least two points which is synchronized to heart activity, said non-excitatory

~~electric potential being a first phase of a bi-phasic pacing pulse circuitry not operating at every beat of the heart.~~

13. *(Currently Amended)* Implantable apparatus comprising circuitry for causing a non-excitatory electric current to flow between at least two points located in the vicinity of a muscle and circuitry for controlling the start time and/or duration of the electric current, wherein said ~~non-excitatory electric current is a first phase of a bi-phasic pacing pulse circuitry for controlling does not operate at every beat of the heart.~~

14. *(Currently Amended)* Apparatus for varying conduction velocity ~~selectively and reversibly reducing the oxygen consumption of an area of a muscle,~~ comprising circuitry for creating a non-excitatory electric potential between at least two points located in the vicinity of the muscle, and comprising circuitry for controlling the start time and/or duration of the electric current flowing between said at least two points which is synchronized to heart activity, said ~~non-excitatory electric potential being a first phase of a bi-phasic pacing pulse circuitry not operating at every beat of the heart.~~

15. *(Currently Amended)* Apparatus for varying conduction velocity ~~reducing the contraction force of a muscle,~~ comprising:

means for creating an electric potential between at least two points located in the vicinity of the muscle;

means for causing a non-excitatory DC electric current to flow between said at least two points, if desired; and

means for controlling the start time, duration and magnitude of the non-excitatory electric potential and/or of the non-excitatory electric current flowing between said at least two points.

16. *(Canceled)*

17. *(Currently Amended)* A method for varying conduction velocity ~~reducing the contraction force of a muscle,~~ comprising creating a non-excitatory electric potential between at least two points located in the vicinity of the muscle, and controlling one or more of the parameters consisting of start time, duration, magnitude and polarity of the non-excitatory electric potential created between said at least two points.

18. *(Currently Amended)* A method for varying conduction velocity ~~reducing the contraction force~~ of a muscle, comprising causing a non-excitatory electric current to flow between at least two points located in the vicinity of the muscle as a first phase of a bi-phasic stimulation pulse, and controlling one or more of the parameters consisting of start time, duration, magnitude and polarity of the non-excitatory electric current flowing between said at least two points.

19. *(Previously Presented)* A method according to claim 17 or 18, wherein the muscle is a cardiac muscle.

20. *(Previously Presented)* A method according to claim 18, wherein the non-excitatory electric current is a DC current.

21. *(Canceled)*

22. *(Previously Presented)* A method according to claim 18, wherein the flow of the non-excitatory DC electric current is synchronized to heart activity.

23. *(Canceled)*

24. *(Currently Amended)* A method for performing heart treatment, comprising varying conduction velocity ~~reducing the contraction force~~ of a treated area of the cardiac muscle, by creating a non-excitatory electric potential between at least two points located in the vicinity of the muscle, and controlling one or more of the parameters consisting of start time, duration, magnitude and polarity of the non-excitatory electric potential created between said at least two points, thereby to obtain the desired variation in conduction velocity ~~reduction in muscle contraction~~ at the treated heart area and thereafter performing treatment thereon.

25. *(Currently Amended)* A method for performing heart treatment, comprising varying conduction velocity ~~reducing the contraction force~~ of a treated area of the cardiac muscle, by causing a non-excitatory electric current to flow between at least two points located in the vicinity of the muscle, and controlling one or more of the parameters consisting of start time, duration, magnitude and polarity of the non-excitatory electric current flowing between said at least two points, thereby to obtain the desired variation in conduction velocity ~~reduction in~~

~~muscle contraction~~ at the treated heart area and thereafter performing treatment thereon.

Claims 26-33. *(Canceled)*

34. *(Currently Amended)* A method for performing cardiac treatment, comprising varying conduction velocity ~~reducing the contraction force~~ of the area of the cardiac muscle to be treated, by creating a non-excitatory electric potential between at least two points located in the vicinity of the muscle, and controlling one or more of the parameters consisting of start time, duration, magnitude and polarity of the non-excitatory electric potential created between said at least two points, thereby to obtain the desired variation in conduction velocity ~~reduction in~~ ~~muscle contraction~~ at the heart area to be treated, and thereafter performing the treatment thereon.

35. *(Currently Amended)* A method for performing cardiac treatment, comprising varying conduction velocity ~~reducing the contraction force~~ of the area of the cardiac muscle to be treated, by causing a non-excitatory electric current to flow between at least two points located in the vicinity of the muscle, and controlling one or more of the parameters consisting of start time, duration, magnitude and polarity of the non-excitatory electric current flowing between said at least two points, thereby to obtain the desired variation in conduction velocity ~~reduction in~~ ~~muscle contraction~~ at the heart area to be treated, and thereafter performing the treatment thereon.

36. *(Currently Amended)* A method according to any one of claims 25, ~~29, 30, 33~~ or 35, wherein the non-excitatory electric current is a DC current.

37. *(Canceled)*

38. *(Currently Amended)* A method according to any one of claims 25, ~~29, 30, 33~~ or 35, wherein the flow of the non-excitatory DC electric current is synchronized to heart activity.

Claims 39-46. *(Canceled)*

47. *(Currently Amended)* A method for varying conduction velocity ~~reducing the~~ ~~contraction force~~ of a muscle, comprising:

providing means for creating an electric potential between at least two points located in

the vicinity of the muscle;

providing means for causing a non-excitatory DC electric current to flow between said at least two point;

providing means for switching the current polarity between said at least two points; and

providing means for controlling the start time, duration and magnitude of the electric current flowing between said at least two points.

48. *(Canceled)*

49. *(Canceled)*

50. *(Previously Presented)* A method according to claim 47 or 48, wherein the means for causing a non-excitatory DC electric current to flow, are synchronized to heart activity.

Claims 51-57. *(Cancelled)*

58. *(Withdrawn)* Apparatus for heart pacing with cardiac output modification, comprising:

one or more electrodes adapted to apply electrical signals to cardiac muscle segments;

signal generation circuitry adapted to apply an excitatory electrical pulse to at least one of the one or more electrodes to pace the heart and a non-excitatory stimulation pulse of a magnitude and at a timing at which it is unable to generate a propagating action potential to at least one of the one or more electrodes to modify the cardiac output; and

at least one pressure sensor which senses cardiac activity, wherein the sensor is coupled to the signal generation circuitry, which generates the pulses responsive thereto.

59. *(Withdrawn)* Apparatus for heart pacing with cardiac output modification, comprising:

one or more electrodes adapted to apply electrical signals to cardiac muscle segments;

signal generation circuitry adapted to apply an excitatory electrical pulse to at least one of the one or more electrodes to pace the heart and a non-excitatory stimulation pulse of a magnitude and at a timing at which it is unable to generate a propagating action potential to at least one of the one or more electrodes to modify the cardiac output; and

at least one sensor which senses cardiac activity, wherein the sensor is coupled to the signal generation circuitry, which generates the pulses responsive thereto.

60. *(Withdrawn)* Apparatus for heart pacing with cardiac output modification, comprising:

one or more electrodes adapted to apply electrical signals to cardiac muscle segments;
signal generation circuitry adapted to apply an excitatory electrical pulse to at least one of the one or more electrodes to pace the heart and a non-excitatory stimulation pulse of a magnitude and at a timing at which it is unable to generate a propagating action potential to at least one of the one or more electrodes to modify the cardiac output; and

at least one oxygen sensor which senses cardiac activity, wherein the sensor is coupled to the signal generation circuitry, which generates the pulses responsive thereto.

61. *(Withdrawn)* A method for heart pacing with modification of cardiac contraction, comprising the steps of:

(a) implanting a pacing electrode in a first chamber of a subject's heart;
(b) implanting a non-excitatory stimulation electrode in another chamber of the subject's heart;

(c) conveying an excitatory electrical pulse to at least one of the electrodes to pace the heart; and

(d) conveying a non-excitatory stimulation pulse of a magnitude and at a timing at which it is unable to generate a propagating action potential to at least one of the electrodes to modify the cardiac contraction.

62. *(Withdrawn)* A method for heart pacing with modification of cardiac contraction, comprising the steps of:

(a) implanting at least one non-excitatory stimulation electrode in each of a plurality of chambers of a subject's heart;

(b) conveying an excitatory electrical pulse to at least one of the electrodes to pace the heart; and

(c) conveying a non-excitatory stimulation pulse of a magnitude and at a timing at which it is unable to generate a propagating action potential to at least one of the electrodes to modify

the cardiac contraction.

63. *(Withdrawn)* A method for heart pacing with modification of cardiac contraction, comprising the steps of:

- (a) fixing at least one electrode to the epicardium of a subject's heart;
- (b) conveying an excitatory electrical pulse to at least one of the electrodes to pace the heart; and
- (c) conveying a non-excitatory stimulation pulse of a magnitude and at a timing at which it is unable to generate a propagating action potential to at least one of the electrodes to modify the cardiac contraction.

64. *(Withdrawn)* A method for heart pacing with modification of cardiac contraction, comprising the steps of:

- (a) applying one or more electrodes to a subject's heart;
- (b) conveying an excitatory electrical pulse to at least one of the one or more electrodes to pace the heart;
- (c) conveying a non-excitatory stimulation pulse of a magnitude and at a timing at which it is unable to generate a propagating action potential to at least one of the one or more electrodes to modify the cardiac contraction; and
- (d) applying a sensor which senses cardiac activity to the subject's body,
wherein conveying the non-excitatory stimulation pulse comprises generating a pulse responsive to the activity.

65. *(Withdrawn)* A method for heart pacing with modification of cardiac contraction, comprising the steps of:

- (a) applying one or more electrodes to a subject's heart;
- (b) conveying an excitatory electrical pulse to at least one of the one or more electrodes to pace the heart;
- (c) conveying a non-excitatory stimulation pulse of a magnitude and at a timing at which it is unable to generate a propagating action potential to at least one of the one or more electrodes to modify the cardiac contraction; and
- (d) applying a pressure sensor which senses cardiac activity to the subject's body,

wherein conveying the non-excitatory stimulation pulse comprises generating a pulse responsive to the activity.

66. (*Withdrawn*) A method for heart pacing with modification of cardiac contraction, comprising the steps of:

- (a) applying one or more electrodes to a subject's heart;
- (b) conveying an excitatory electrical pulse to at least one of the one or more electrodes to pace the heart;
- (c) conveying a non-excitatory stimulation pulse of a magnitude and at a timing at which it is unable to generate a propagating action potential to at least one of the one or more electrodes to modify the cardiac contraction; and

(d) applying an oxygen sensor which senses cardiac activity to the subject's body, wherein conveying the non-excitatory stimulation pulse comprises generating a pulse responsive to the activity.